APPROVAL SHEET FOR SUSPENDED LOAD OPERATIONS

SLO-KSC- 2000 – 004

TITLE INSTALLATION OF THE CANADIAN CAMERA ONTO THE SSRMS

DOCUMENT NUMBER/TITLE E5533 MULTI PURPOSE HOISTING

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DATE 30 OCT 00

REQUIRED APPROVAL

CONTRACTOR	____	DESIGN	____	R & QA	x	OPERATIONS	X	SAFETY
NASA	____	DESIGN	____	R & QA	x	OPERATIONS	X	SAFETY

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NASA SUSPENDED LOAD OPERATION
ANALYSIS/APPROVAL

NUMBER: SLO-KSC-2000-004
October 30, 2000

OPERATIONS

Installation of the Canadian Camera onto the SSRMS.

SUPPORTING DOCUMENTS - The associated operational procedure and System Assurance Analysis (SAA) are as follows:

- OMI E5533 Multi-Purpose Hoisting
- SAA21CRS1-001, 30 Ton Highbay Bridge Cranes - Space Station Processing Facility (SSPF)

GENERAL DESCRIPTION

The installation of two Canadian cameras is required to complete the SSRMS. Each camera weights approximately 70 lbs.

The task requires the two technicians to be beneath the camera to install and torque the fastners.

The time of installation is expected to last no greater than 15 minutes.

The 30 ton SSPF crane will be used to lift and support the camera throughout this process.

RATIONALE/ANALYSIS - The suspended load tasks comply with the NASA Alternate Safety Standard as follows:

Alternate Standard Requirement #1a

These operations cannot be conducted without placing personnel under the suspended load. The Camera installation requires two (2) technicians to work directly under the suspended payload.

Camera installation operation in SSPF have been evaluated for alternate methods to complete these tasks, and it has been determined that there are no design, operational, or procedural means to eliminate personnel exposure to a suspended load.

During installation operation, the technicians are required to be under the suspended load to install and torque the camera for mating. There is no alternate access to the mating surfaces that is located underneath the payload. This physical limitation precludes any design, operational, or procedural changes that would eliminate personnel exposure to a suspended load.

Alternate Standard Requirement #1b

The possible use of a secondary support system, to catch the load in the event of a crane failure, was analyzed. It was determined that the use of a secondary support system was not feasible because of positioning of the payload on the pallet.

Alternate Standard Requirement #1c

The maximum number of personnel permitted under the suspended load while installing and torquing the camera is two (2) technicians.

Alternate Standard Requirement #1d

Installation will be accomplished as quickly and safely as possible to minimize exposure time. It will take two (2) technicians a maximum of 15 minutes to install each camera.

Alternate Standard Requirement #2:

Suspended load operations are reviewed and approved on a case-by-case/specific need basis - see General Description and Alternate Standard Requirement #1.

Alternate Standard Requirement #3:

Only those suspended load operations approved by the NASA Safety & Mission Assurance Chief will be permitted. A list of approved suspended load operations will be maintained by the NASA Safety & Mission Assurance Division..

Alternate Standard Requirement #4

OMI E5533 will be revised to permit only the approved people under the suspended load. The OMI is available on site for inspection during the operation.

Alternate Standard Requirement #5:

A new suspended load operation not covered by this SLOAA, deemed necessary due to unusual or unforeseen circumstances where real time action is required, shall be documented and approved by the NASA Safety & Mission Assurance Chief.

Alternate Standard Requirement #6

The suspended load operations addressed in this analysis involve one of the 30 ton SSPF bridge cranes. The cranes are designed, tested, inspected, maintained, and operated in accordance with the NASA Safety Standard for Lifting Devices and Equipment, NSS/GO-1740.9.

The SSPF 30 ton crane hoists are equipped with two magnetic holding brakes, each capable of holding the load up to the crane's rated capacity. Each brake's ability to hold the rated load (30 tons) is verified annually. The cranes are designed to meet a 5 to 1 safety factor based on ultimate strength for the hoist load bearing components. The 30 ton cranes are load tested annually at 100% of their rated capacities. Detailed preventive maintenance is performed monthly, quarterly, semiannually, and annually on the cranes to ensure proper operation. A detailed inspection of the lifting slings is performed annually. Nondestructive testing of the slings and crane hooks is performed annually..

Alternate Standard Requirement #7 - An SAA has been completed on the 30 ton bridge cranes in the SSPF. The SAA includes a Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL) and a hazard analysis (see supporting documents). No critical single failure points were identified during this analysis.

Alternate Standard Requirement #8 - Visual inspections for cracks or other signs of damage or anomalies are performed on the hoist hooks, hoist beams, hoist cables, hoist rod assemblies, and hoist fittings, and crane functional checks are performed

before each operation per NSS/GO-1740.9.

Alternate Standard Requirement #9 - Trained and licensed crane operators shall remain at the hoist controls while personnel are under the load.

Alternate Standard Requirement #10 - Appropriate safety control areas are established before initiating operations. Only the minimum number of people (manloaded in the procedure) will be permitted in this area.

Alternate Standard Requirement #11 - A pretask briefing and a safety walkdown of the area will be conducted prior to the lift to ensure that all systems and personnel are ready to support. All participants are instructed on their specific tasks and warned of potential hazards. Following any crew change, the new personnel are instructed by the task leader on their specific tasks and warned of any hazards involved.

Alternate Standard Requirement #12 - The person beneath the suspended load will be in voice contact with the hoist operator and/or task leader. Upon loss of communication, the operation shall stop immediately, personnel shall clear the hazardous area, and the load shall be safed. Operations shall not continue until communications are restored.

Alternate Standard Requirement #13 - Personnel working beneath the load shall be in continuous sight of the hoist operator and/or task leader.

Alternate Standard Requirement #14: The NASA Safety & Mission Assurance Division shall conduct periodic reviews to ensure the continued safety of suspended load procedures.

Alternate Standard Requirement #15: The NASA Safety & Mission Assurance Division will provide copies of approved SLOAA's, a list of approved suspended load operations, a list of cranes/hoists used for suspended load operations and copies of the associated FMEA/CIL and hazards analyses to NASA Headquarters.

APPROVAL: **DATE:**

Bruce L. Jansen 10/31/00

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